

Lesson 3 Overview



DRIVING QUESTION: *How does climate limit where your focal species lives?*



LEARNING GOALS:

- Students create a scientific explanation to answer the question, “Can your focal species live in the same area as one of its prey?”
- Students make a justified prediction to answer the question, “Can your focal species live in your state?”



TOTAL TIME: 100 minutes

LESSON SUMMARY:

Using the map resource, students overlay the distribution map of their focal species with temperature and precipitation maps to define the range of abiotic conditions where the species is found. Students conclude the lesson by writing a justified prediction about whether their species can live in an area with a particular climate.



MATERIALS:

- *Computers with internet access*

BEFORE YOU BEGIN LESSON 3:

Part 1

	Before students learn about their individual focal species, you may want to introduce them to a particular species, northern pike, as an example of how to use the distribution maps. As a class, choose northern pike in the focal species chooser (previous lesson) and review its Critter Catalog information, such as predators, prey, and habitat. Then, introduce the northern pike's distribution map by viewing the distribution in the map resource in this lesson.
	<p>Discussion questions for learning how to use distribution maps:</p> <ul style="list-style-type: none"> o How do I pan on the map? o How do you turn on layers to add more information? (What do layers do?) o What does the distribution map show? o How do I zoom in and out? o Can I circle something on the map? o Can I erase something I circled?
	<p>Discussion questions for interpreting the information on the distribution map:</p> <p>Are northern pike found in any place throughout their distribution? Or are there particular habitats within that distribution that they need?</p> <p>What are some reasons that you might not find northern pike in every part of their distribution? (Example reasons: northern pike are found only in aquatic habitats. Once students have an understanding of distribution maps, have them individually work with their focal species.</p>

Part 2

	<p>In Part 2, students think about food web interactions between predators and prey. You may wish to review predator/prey interactions and demonstrate how to draw a food chain or food web.</p>
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Part 3

	<p>In Part 2, students learn about the overlap in distribution between their focal species and a prey of their focal species. You may want to demonstrate this with northern pike, as you did in Part 1.</p>
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Part 1: The Focal Species

To begin this lesson, students use map layers in SPECIES to understand where their focal species is found. This initial activity serves to orient students to viewing (turning on and off) map layers, you may want to give them some time to become comfortable with this aspect of the interface.

Lesson 3 Part 1: Where does my focal species live?

Driving Question:

How does climate limit where your focal species lives?

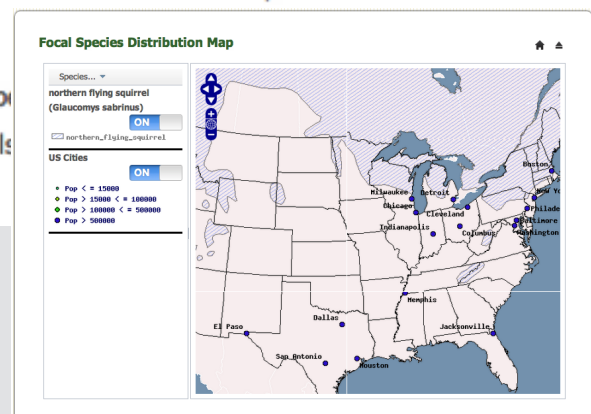
Introduction:

In this lesson, you will use a distribution map of your focal species and overlay it with temperature and precipitation maps to define the range of abiotic conditions where the species is found. You will then write a justified prediction about whether the species can live in an area with a particular climate.

- Go to the Focal Species Viewer in Resources and look up your focal species.
- Find the section that describes your focal species' preferred habitat.
- What type of habitat does your focal species prefer? Summarize the description of your focal species' habitat in the box below.

Northern flying squirrels mainly live in areas with conifer trees, but they are found in other kinds of forests too.

- Look at the **distribution** of your focal species in the Focal Species Distribution Map in the Resources box. The purpose of a species distribution map is to tell you where your species can be found.
- Turn on the layer with your focal species' name next to it. The shaded zones represent places where your species is most likely to be found.
- Turn on the cities layer to see where cities are located on the map. Are there cities in areas your focal species could be found?
- Since habitat can change quickly, there will be places where your species does not prefer. There might also be places where your species can live at all, such as a city.



Part 2: What does my focal species eat?

In this activity students research the prey species of their focal species and think about food web relationships among species in an ecosystem.



Lesson 3 Part 2: Eating

What does my focal species eat? Does it get eaten?

Predators and prey are two terms commonly used by scientists to describe the feeding relationship between species. Predators are animals that eat other animals, and prey are the animals that predators eat. Many species are both predators and prey. Your focal species is likely a predator to some animals and prey of other animals. Use the Focal Species Chooser to read about your focal species and find out which species eat and are eaten by your focal species.

- Which species are listed as prey of your species?

They eat bird eggs and insects.

- Which species are listed as p

Predators include owls, hawks, ar

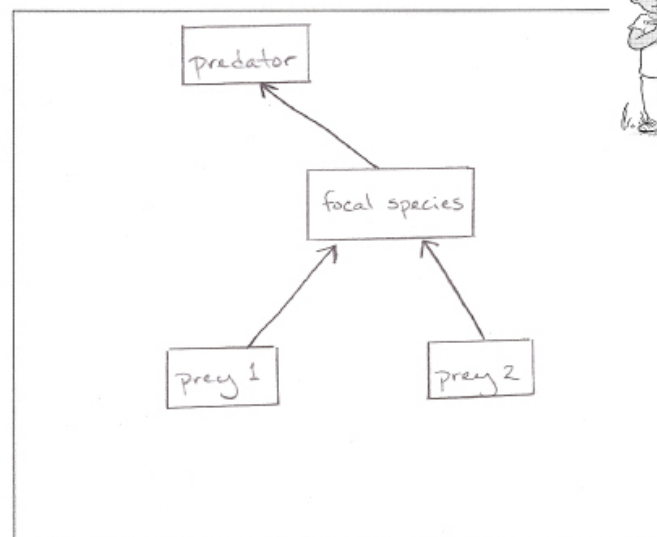


Lesson 3 Food Chain of Your Focal Species' Predators and Prey

What is a Food Chain?

Remember that the arrows on a food chain go *from the prey* and *to the predator*. The arrows move this way because they represent the flow of energy from the source of energy (the prey) to the consuming species (the predator). For example, a food chain with a rabbit and wolf would show an arrow going *from* the rabbit *to* the wolf.

In the box below, draw a food chain of your focal species' predators and prey. Be sure to pay attention to which direction your arrows are pointing.



Part 3: How hard is it for my focal species to find its prey?

In this activity, students use the map viewer to explore how the distribution of their focal species overlaps with those of their prey.

Lesson 3 Part 3: Maps of predators and prey

How hard is it for my focal species to find its prey?

- Turn on the **distribution** map for the Northern Pike (resource on the right). You'll see a pull-down list where you can select a **prey species** that northern pike eat. Select one, and turn on the **map layer** for it. Do this for all the prey species. Look carefully to compare the distribution of its prey and note the areas where the species overlap and do not overlap. Pay attention to how much of the area is overlapping.
- Choosing one prey species at a time, overlay the distribution of your **focal species** with its prey, the way you did for the Northern Pike.
- Are all of the **prey distribution maps** the same?

No

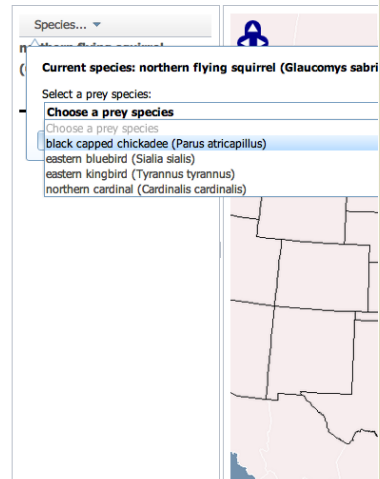
- Why don't the distribution maps exactly line up?

Each species has its own distribution or set of places that are appropriate habitat.

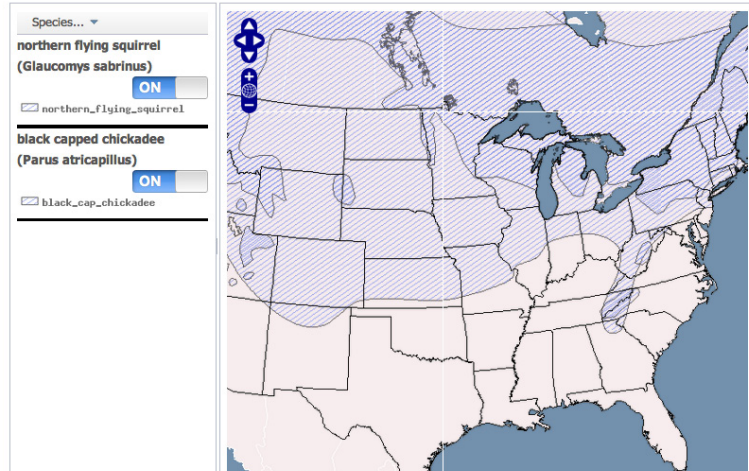
- Choose a prey **species** from the list that you would like to take a closer look at in this lesson.

Use the Focal Species and **Prey Distribution** Map. Two species should appear on the list to the left of the map, your focal species and the prey species you selected. Turn on both layers. Use the information about the species distribution to answer the following **scientific question**:

Focal Species and Prey Distribution Map



Focal Species and Prey Distribution Map



Part 3: How hard is it for my focal species to find its prey?

In this activity, students use the map viewer to explore how the distribution of their focal species overlaps with those of their prey.



Scientific Question: Can your focal species live in the same area as one of its prey?

A scientific explanation provides knowledgeable information and backing to answer a scientific question about an event or process. An explanation has three parts:

- Claim - A complete sentence that answers the scientific question.
- Reasoning - A scientific definition or fact that supports the claim and that links the claim to the evidence.
- Evidence - Selected data or observations that support the claim and that answer the scientific question. Whenever possible, two pieces of evidence should be provided to strengthen the explanation.

My Explanation

Claim:

Hint

Yes, my focal species can live in the same area as one of its prey.

Reasoning:

Hint

The distribution maps of my focal species and the prey species overlap, so they are found in some of the same places.

Evidence:

Hint

1. The distribution map of the focal species shows that it is found in some of the places that the prey are found.
2. The distribution map of the prey species shows that it is found in some of the places that the focal species (its predator) is found.



Part 4: How do abiotic factors affect where my species live?

Begin with a class discussion about: What influences where my focal species can live? (If possible, write the answers down on the board).

Answers include: Habitat (defined as a place that provides food, water, shelter and space for living things), prey, temperature, snowfall, rainfall

Create a comparison chart with one side titled “Biotic” and the other side “Abiotic.” As a class, discuss what abiotic and biotic means and enter student answers under each category.

Lesson 3 Part 4: How do abiotic factors affect where my species lives?

Turn on your [focal species distribution](#) map. This [maps](#) shows information about where your focal [species](#) lives. Next, overlay the temperature map on top of the distribution map. The temperature map shows different ranges of [average](#) temperature across North America. Focus your attention specifically on the areas of the map where the distribution and temperature intersect. When distribution and temperature overlap, it tells you the range of temperatures in which your focal species is found. Use this information to fill out Table 1.

Resources

[Temperature](#)
[Precipitation and](#)
[Focal Species Map](#)

Table 1: Range of temperature values where your species is found.

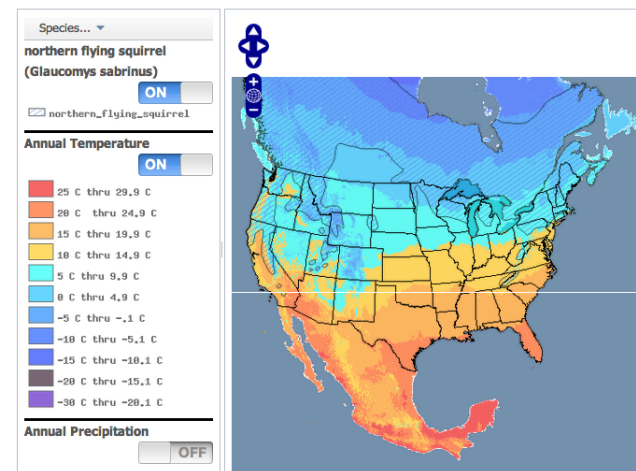
Lowest average temperature within your focal species' distribution	Highest average temperature within your focal species' distribution	Total range of temperature values for your focal species' distribution
-0.1	9.9	-0.1 to 9.9

After completing Table 1, turn off only the temperature layer. Make sure both the distribution map and [precipitation](#) map are turned on. Use this information about precipitation to fill out Table 2.

Table 2: Range of precipitation values where your species is found.

Lowest average precipitation within your focal species' distribution	Highest average precipitation within your focal species' distribution
50	149.9

Temperature Precipitation and Focal Species Map



Part 4: How do abiotic factors affect where my species live?

Students use the information they gathered on how abiotic conditions affect the distribution of their focal species to answer the scientific question: Can your focal species live in your state?



You have learned some of the **abiotic** conditions for your focal species. Use this information to answer the following **scientific question**:

Scientific Question: Can your **focal species** live in your state?

My Prediction

Claim:

Hint

Northern flying squirrels can live in Michigan.

Reasoning:

Hint

Michigan contains a range of temperatures and precipitation amounts that northern flying squirrels can live in.

Evidence:

Hint

1. Average temperatures that northern flying squirrels can survive in are found in Michigan.
2. Average precipitation amounts that northern flying squirrels can survive in are found in Michigan.

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